Cerebral Arteries Stenting With Emboli-Protection Devices: Report of Five Cases and Six Months Follow-Up.

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Citation

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Abstract

It was established that carotid endarterectomy is superior to medical management forthe prevention of stroke in patients with symptomatic and asymptomatic carotid and vertebral artery stenosis. Stenting with the use of emboli-protection device is a less invasive procedure than endarterectomy in stenosis of cerebral arteries. In this study, we have reported our experiences of stenting in symptomatic patients (Mean age=66.8 Years). All of patents were male, 20% of patients had Diabetes Mellitus and 40% had hypertension. There was involvement of coronary artery (60%). Indications for stenting were prior stroke in one patient, vertigo in another patient and transient ischemic attack in three patients. Primary stenting with self-expandable stents were deployed. Technically successful procedures are achieved in all patients. There were no stroke, death and restenosis occurred. In conclusion, cerebral arteries stenting is feasible with a high degree of technical success.

INTRODUCTION

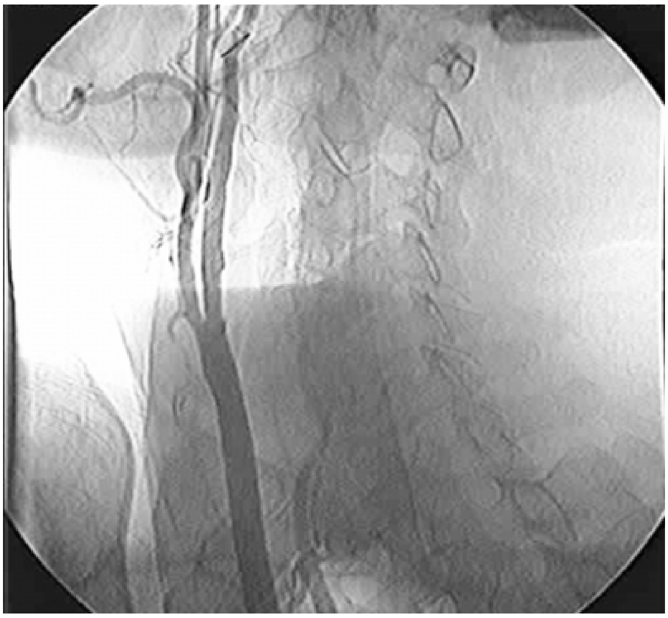
Atherosclerotic stenosis of the carotid artery causes about 20% of all ischemic strokes and transient ischemic attacks [1]. The advantage of carotid endarterectomy over medical therapy in patients with significant carotid stenosis has been established in several clinical trials [2, 4]. Shorter hospitalization, avoidance of anesthesia and avoidance of surgical incision make carotid angioplasty and stent placement attractive [3]. During the past decade, carotid angioplasty with stenting has been used to treat patients at high surgical risk [4]. But an important concern is intra procedural embolization. Emboli-protection devices have been developed to reduce this problem [4]. We reported our experience for carotid and vertebral artery stenting with emboli-protection device in five patients and following up for a period of six months.

PATIENTS AND METHODS

From March 2003 to March 2004, 5 patients underwent carotid and vertebral angioplasty and stenting at Emam Reza Hospital (Mashhad/Iran). All of patients were men and their ages ranged from 60 to 72 (Mean age=66.8 Years). Three patients (100%) had symptomatic cerebral artery stenosis, 1(20%) with vertigo, 1 (20%) with previous stroke and 3 (60%) with hemispheric transient ischemic attack. Color duplex ultra-sonography and brain axial CT-scan were done in all patients. Patients were required to have a stenosis at least 70% of the luminal diameter on color duplex ultra sonography. All patients underwent diagnostic aortic arch and four-vessel angiography that included selective carotid and vertebral angiography. Significant angiographic stenosis was defined as more than 70% diameter stenosis. All patients received aspirin 100 mg/day and ticlopidine 250 mg/BID or clopidogrel 75 mg/day for one week before the procedure. In our technique angiography and stenting were performed with local anesthesia via the femoral approach. After arterial access 5000-10000 units heparin were administered in all patients. No sedation was given before and through out the procedure. Hemodynamic was continuously monitored. The stenotic lesion was crossed with protection device (filter wire EZ) that placed 2 cm distal to lesion: and expanded before the stent was deployed. All the lesions were treated with self-expandable stent (carotid wallstent Boston scientific). After stent deployment, post dilation with balloon 5 mm in diameter was performed. Just before balloon inflation, atropine 1 mg administered to prevent bradycardia. At the end of the procedure, the emboli-protection device containing the captured emboli was collapsed and removed. Carotid and vertebral angiography was performed in all patients to assess technical results and the presence of distal spasm (Figure-1).

Figure 1

Figure-1 Angiograms demonstrating left internal carotid artery ostial stenosis in a 70 years old man with history of hypertension that presented with transient ischemic attack and color Doppler ultra-sonography revealed 70% stenosis in left internal carotid artery (A) and final result after stenting (B)



After the procedure all patients were observed in CCU for 48 hours and blood pressure and heart rate carefully monitored. Patients were usually discharged after 48 hours and after examination by a neurologist and were prescribed ticlopidine 250 mg/BID or clopidogrel (75mg/day) for 3 months and aspirin 100 mg/day not time limited. Out patient follow-up was conducted at 30 days, 1, 3 and 6 months after procedure. Six months after the procedure color duplex-ultra sonography was repeated in all patients.

Technical failure was defined, as post-stenting residual stenosis equal to or greater than 30%, recurrent or residual in stent stenosis was defined as more than 50% diameter reductions as determined with duplex ultra sosnography.

RESULTS

Patients' characteristics: one patients (20%) had diabetes Mellitus and two patients (40%) had hypertension, three patients (60%) had severe coronary artery disease. Indication for intervention were a prior stroke in one patient, symptoms related to vertebrobasilar ischemia (vertigo attacks) in one patient and hemispheric transient ischemic attack in three patients. The patient clinical characteristics and demographics are shown in Table-1.

Figure 2

Table-1 Baseline Patient Characteristics

Characteristics	Number	Percent
Patients	5	100%
Mean Age (Year)	66.8	-
Male/Female	5/0	100% Male
Diabetes Mellitus	1	20%
Hypertension	2	40%
Coronary artery disease	3	60%
Stroke	1	20%
Transient Ischemic Attack	3	60%
Vertigo	1	20%

ANGIOGRAPHIC RESULTS

Most lesions were located at the proximal proportion of vessels. The treated cerebral arteries were the left vertebral artery in one patient, the right internal carotid artery in three patients and left internal carotid artery in one patient. A technically successful procedure was achieved in all patients. No significant residual stenosis occurred. No immediate neurological problems occurred after cerebral artery stenting. Two patients had hypertension instability due to internal carotid artery balloon dilation. No stroke, death or myocardial infarction occurred at 30 days follow-up. During follow-up at 1 to 6 months, all patients remained neurologically unchanged, and color duplex ultra sonography revealed that all stents were patent without residual or recurrent stenosis.

DISCUSSION

The most common cause of cerebral artery stenosis is atherosclerosis, according to finding from European Carotid Surgery Trial (ECST) [5] and North American Symptomatic Carotid Endarterectomy Trial (NASCET)[6] carotid surgery is the standard treatment for severe symptomatic carotid artery stenosis. In ECST and NASCET, the 30 days stroke and death rate in patients in surgical group were 7.0% and 6.5% [6]. There have been many reports on the percutaneous interventional treatment of cerebral arteries in the basis of CAVATAS Trial; angioplasty is better than surgery because they avoid risks related to the incision in the neck and general anesthesia. Also according to CAVATAS, no difference in the major risks of balloon angioplasty or stenting compared with carotid surgery (10% frequency of death or any stroke in both groups) according to SAPPHIRE [4] trial stenting was not inferior to surgery, and the rate of death and stroke within 30days was 4.8% in stenting group and 9.8% in endarterectomy group. Wholey and colleagues reported that carotid stenting had a complication rate of stroke and death within 30 days of treatment of 5.8%. However cerebral embolization is currently considered the major risk associated with carotid artery stenting [7]. Most strokes after carotid angioplasty are the result of plaque fracture, in the carotid artery at the time of balloon inflation with subsequent thrombosis and embolism. For this reason, primary stenting is seemed to be safer than simple balloon angioplasty [1]. Stents will also prevent a free intimal flap from dissection. Improved dilation achieved by stenting than with balloon angioplasty might also reduce the rate of stroke in the short-term after treatment [1]. Also distal protection devices reduce intra procedural embolization during carotid artery stenting [8]. In our study, primary carotid and vertebral stenting with emboli-protection device, successfully was done in all patients, without any complications. Short-term follow-up didn't showed residual stenosis or restenosis. In conclusion, cerebral artery stenting can to perform safely and may provide an alternative to endarterectomy especially in patients with high surgical risk, however long-term follow-up is required.

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